**Computer Science 331a, Fall 2011**
# Foundations of Computer Science

## *ASSIGNMENT 3*
## Due: Wednesday, November 16, 2011

1. Write regular expressions for the following languages over $\{0, 1\}$:

   (1) the set of words that start with 1, end with 11, and have 010 as a subword.

   (2) the set of all words not containing consecutive 1's,

2. Given the following regular expression $E$,

$$(a + b)^* ab^* a(a + b)^*$$

   construct a $\varepsilon$-NFA $A$ such that $L(A) = L(E)$.

3. Construct a finite transducer for the following process:

   For input from $\{0, 1\}^*$, if the input ends in 01, output A; if the input ends in 10, output B; otherwise, output C.

4. (Bonus) Let $L_1$ and $L_2$ be two languages. Define

$$L_2 \backslash L_1 = \{y \mid xy \in L_1 \text{ and } x \in L_2\}.$$

   Prove that if $L_1$ is a DFA language, then $L_2 \backslash L_1$ is a DFA language.

5. Given the following NFA, construct an equivalent regular expression.